# MODELING FLATS PIECE SORTING COSTS IN FY07

The following is an attempt to help determine why the Postal Service's proposed Periodicals flats model, in its FY07 version, shows much fewer piece sorting costs than were in fact attributed to Periodicals by the CRA.

Essentially, the FY07 model of AFSM 100 flats operations does not reflect how those operations really were performed in FY07. In particular, MODS data indicate that a very substantial number of workhours were spent at operation 140, which is used by employees that prep bundles and feed flats to AFSM-100 machines via the AI (Automated Induction) attachment to those machines that have been installed in the last couple of years. The associated costs do not appear to be represented anywhere in the model, and this may be one reason why the model understates the piece sorting costs charged to Periodicals flats.

I base the discussion below on information extracted from USPSFY07 LR-7 (cost pools), LR-11 (flats models) and LR-23 (MODS data), and information provided in the testimony and interrogatory responses of witness McCrery in R2006-1.

AFSM 100 machines had four different configurations in FY07:

(1)     the traditional AFSM-100;

(2)     AFSM-100 with automated tray handling systems (ATHS);

(3)     AFSM-100 machines with AI (automated induction) installed; and

(4)     AFSM-100 machines with both ATHS and AI.

Table 1 shows the MODS numbers associated with each machine configuration and each flats sorting scheme. MODS number 140 is used by employees who feed flats to the AFSM-100 via the AI attachment. They break bundles, thereby replacing bundle preparation previously performed in MODS operation 035. It is my understanding that flats already in trays also are entered via the AI unit on machines so equipped.

Table 2 shows the pieces fed each machine configuration for each sort scheme in FY07, according to the MODS summary data in LR-23. As the table shows, substantial volumes were sorted by all four machine configurations, but the largest portion (13.2 billion flats) were sorted by the most automated configuration, i.e., machines with both ATHS and AI.

Table 3 shows the workhours recorded at the various AFSM 100 configurations and sorting schemes, again according to LR-23. Almost half of all such hours were recorded at operation 140, the AI flats prepping operation; 8.49 million hours versus 9.28 million at all other AFSM 100 operations.

The costs associated with all of these workhours, including the MODS 140 hours, are part of the AFSM cost pool. Considering the number of workhours, one must assume

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that the AI prep operation (MODS 140) incurred almost half of all AFSM costs. I do not know what portion of these costs was attributed to Periodicals, but it seems clear that those costs are not represented in the current model.

Before discussing how those costs may be included in the model, let me point out some rather surprising conclusions that can be drawn from the numbers in tables 2 and 3. First, if we consider the two machine versions without AI, the total number of flats fed to those machines was 12.77 billion (Table 2) and the total number of workhours was 5.8 million, giving an overall productivity rate for those machines of 2,202 flats per workhour. For the configurations equipped with AI, total flats volume fed was 16.605 billion, and total workhours used, including the 8.49 million flats preparation workhours, were 11.967 million. That gives an average productivity rate of only 1,388 flats per workhour, much lower than the 2,202 for the machines without AI.

Of course, the two numbers are not really compatible because the flats sorted on machines without the AI need to be prepped elsewhere – most likely at the MODS 035 flats preparation operation. But the difference does illustrate the importance of the flats prepping costs. The average FY07 productivity rate for all AFSM 100 machines on all sort schemes comes to 1,653. But if one were to ignore the hours in operation 140, the productivity rate would be 3,165 flats per workhour. It would be even higher on the machines equipped with AI.

Now let us consider what the current model does. In fact it does the same thing as the R2006-1 model. Since there were no ATHS or AI in FY05, that model started with the FY05 AFSM 100 productivity rates at each sort scheme and assumed that by FY08 each productivity would have increased by 25% due to deployment of ATHS systems. No assumption was made regarding the impact on productivity of AI deployment.

The present model does the same thing, except it starts with FY07 productivity rates for machines with no ATHS (or AI), rather than the FY05 rates. Then again it assumes a 25% productivity increase. But this seems rather odd considering that in FY07 ATHS systems had been deployed and so it is possible to use real data on machines with ATHS.[1] Table 4 illustrates that machines with ATHS did achieve somewhat higher productivity rates than those without, but the difference was much less than 25% in most cases. The first column in that table shows the productivity rates that were assumed to apply in TY08 in the R2006-1 model. The second column shows the rates assumed in the FY07 model. The third column shows the actual FY07 ATHS rates, which are considerably lower than those assumed in the model. The last column shows the FY07 productivities without ATHS (or AI). Comparing the last two columns, it seems that the productivity improvement due to ATHS, though real, is considerably less than 25%.

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[1] Models developed in rate cases typically would extrapolate from (known) facts in the base year to various assumptions about the test year. But the purpose of the FY07 model is simply to analyze FY07 costs using FY07 data, and for that it should not be necessary to make any stipulations about the capability of systems not yet deployed.

To summarize, it should be fairly straightforward to model costs incurred by flats that are sorted on the first two machine configurations. But the configurations with AI, which handled more than half of all flats in FY07 and may handle an even larger portion in the future, present a more difficult problem, due to the dominance of the MODS 140 costs.

One solution might be to try to model the 140 costs separately, like the 035 costs already are modeled separately. But the logic to distribute 035 costs relies on the fact that flats only reach the flats preparation once, when they are in a bundle and the bundle needs to be cut. A flat that requires multiple sorts may hit the 140 operation more than once. For example, it might be in an ADC bundle the first time, when the AI employee first cuts the bundle and then inserts it in the queue to the AFSM 100 machine. Next time it could come in a tray and may require less time to handle than when it was in the bundle, but the relationship between the costs of the two types of handling is not known.

This approach might still be feasible if the Postal Service were able to conduct a study that compares the time to handle flats that arrive in trays with the time to handle flats that arrive in bundles. Additionally, IOCS tallies would need to be analyzed in order to separately attribute CRA AFSM 100 costs incurred at the 140 operation and other costs in the AFSM cost pool. Clearly this is not a practical quick fix for the current model, but it might be considered in the future.

A different approach, which I recommend as an interim solution, is to take the current average AFSM 100 productivity rates by sort scheme, without including the 140 costs, then degrade all productivity rates by a factor equal to 1653/3165, which is the ratio of the average productivities with or without the 140 costs included. This is not an ideal approach, but it can be implemented easily and would yield more accurate results than if the AI mail prep costs simply are ignored. This approach would reduce the discrepancy between modeled piece sorting costs and those indicated by the CRA and should be used prior to application of an overall CRA adjustment.

| Table 1: MODS Number For AFSM-100 Flats Operations | | | | |
|---|---|---|---|---|
| Type of Operation | AFSM100 | AFSM100/ ATHS | AFSM100/ AI | AFSM100/ ATHS/AI |
| Outgoing Primary | 331 | 401 | 461 | 141 |
| Outgoing Secondary | 332 | 402 | 462 | 142 |
| Incoming MMP | 333 | 403 | 463 | 143 |
| Incoming SCF | 334 | 404 | 464 | 144 |
| Incoming Primary | 335 | 405 | 465 | 145 |
| Incoming Secondary | 336 | 406 | 466 | 146 |
| Box Section | 337 | 407 | 467 | 147 |
| AI (Automatic Induction) Mail Prep | | | 140 | 140 |

| Table 2: FY07 Pieces Fed Per AFSM 100 Operation (1,000's) | | | | | |
|---|---|---|---|---|---|
| | AFSM100 | AFSM100/ ATHS | AFSM100/ AI | AFSM100/ ATHS/AI | AFSM 100 Total |
| Outgoing Primary | 832,645 | 764,822 | 426,653 | 1,652,576 | 3,676,696 |
| Outgoing Secondary | 79,604 | 123,283 | 17,540 | 199,319 | 419,746 |
| Incoming MMP | 756,493 | 1,116,937 | 311,957 | 1,997,695 | 4,183,082 |
| Incoming SCF | 916,972 | 618,668 | 581,707 | 2,188,321 | 4,305,667 |
| Incoming Primary | 268,154 | 322,299 | 93,170 | 540,914 | 1,224,537 |
| Incoming Sec/Box Section | 3,932,715 | 3,037,682 | 1,960,485 | 6,634,733 | 15,565,615 |
| Total | 6,786,582 | 5,983,690 | 3,391,512 | 13,213,558 | 29,375,342 |

| Table 3: Workhours recorded at different AFSM 100 operation | | | | | |
|---|---|---|---|---|---|
| Type of Operation | AFSM100 | AFSM100/ ATHS | AFSM100/ AI | AFSM100/ ATHS/AI | AFSM 100 Total |
| Outgoing Primary | 377,290 | 345,400 | 131,556 | 307,532 | 1,161,778 |
| Outgoing Secondary | 32,957 | 46,324 | 3,361 | 18,449 | 101,092 |
| Incoming MMP | 358,293 | 472,865 | 106,212 | 361,420 | 1,298,789 |
| Incoming SCF | 462,276 | 267,547 | 201,182 | 381,775 | 1,312,780 |
| Incoming Primary | 128,387 | 135,166 | 22,851 | 92,042 | 378,445 |
| Incoming Sec/Box Section | 1,866,143 | 1,307,575 | 622,385 | 1,231,360 | 5,027,463 |
| Total Excluding Operation 140 (Flats prep) | 3,225,346 | 2,574,876 | 1,087,547 | 2,392,579 | 9,280,347 |
| AI Flats Preparation | | | 8,486,403 | | 8,486,403 |
| All AFSM 100 | | | | | 17,766,750 |

| Table 4: Assumed & Actual AFSM 100 Productivity rates with ATHS | | | | |
|---|---|---|---|---|
| Type of Operation | Assumed In R2006-1 model | Assumed In FY07 model | Actual FY07 | No ATHS FY07 |
| Outgoing Primary | 2,731 | 2,759 | 2,214 | 2,207 |
| Outgoing Secondary | 3,287 | 3,019 | 2,661 | 2,415 |
| Incoming MMP | 2,861 | 2,639 | 2,362 | 2,111 |
| Incoming SCF | 2,805 | 2,480 | 2,312 | 1,984 |
| Incoming Primary | 2,772 | 2,611 | 2,384 | 2,089 |
| Incoming Sec/Box Section | 2,660 | 2,634 | 2,323 | 2,107 |